Assessment of Criminal Justice Computer Systems

To the Chairmen of the
Senate Finance Committee,
House Appropriations Committee,
and Crime Commission

Virginia Department of Criminal Justice Services

June 30, 2001

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Table of Contents

List of Exhibits

Executive Summary

As part of Item 430.B.1 from the 2000 Appropriations Act, the Department of Criminal Justice Services (DCJS) was tasked to assess and describe the current criminal justice Information Technology (IT) environment within the Commonwealth of Virginia and to estimate the cost of integrating the systems within this environment. This document reports on the findings of DCJS' survey of the computer systems in Virginia that are candidates for integration, and estimates the additions and changes necessary to implement an integration effort in a five-year timeframe.

Over the years, the Commonwealth has built a number of individual systems to meet the mission objectives of specific agencies. These systems use a diverse set of technologies, and although they are adequate for their primary task, they generally do not share information with other systems in the Commonwealth. The exception to this general trend has been a few cases where specialized interfaces between two systems have been implemented to pass specific data. As a result, the criminal justice system has been experiencing problems handling information in an integrated manner. Inefficiencies and errors are introduced when data has to be reentered or separately captured and time-critical information does not get to the appropriate personnel soon enough to be effective. To address these issues, an integration approach must be considered which incorporates new technologies, leveraging from existing information systems and business processes. The objective is to improve on the information exchange paradigm by removing the root causes for the issues while minimizing the financial and operational impacts on the agencies.

To support a successful integration effort, a number of steps have already been taken. A Common Data Dictionary is being created to specify data representation in a uniform format across the Commonwealth. A Business Case was developed to support the economic and mission quality benefits that will result from the integration of data. A Master Integration Plan is in progress that details the plan for integration and describes the budgets needed. A Charge Standardization Project is in progress to improve data quality by standardizing data in the Magistrate system, which is usually the point of original entry for intake data on individuals. This project will include the implementation of an offense tracking number and a uniform charging table.

For this report, a hybrid architecture based on earlier studies was selected for the integration effort. This architecture utilizes a combination of integration techniques appropriate to the systems being integrated. The architecture serves as the context for estimating the impact to Commonwealth systems evaluated using a well-defined methodology for estimating impacts.

Based on the best available information, a planned comprehensive integration effort will require the addition of commercial middleware to the Commonwealth's larger server systems, the creation of gateway software for smaller Commonwealth and local systems, and the expenditure of approximately 73 man-years of labor over the next 5 years. A description of the estimating methodology and of what is included in the estimates is contained in Sections 5 and 6 of this report.

Section 1 – Introduction

1.1 Purpose

The Computer Assessment was developed to assess and describe the current criminal justice IT environment within the Commonwealth of Virginia and to estimate the cost of integrating the systems within this environment. This assessment was developed to address the requirements of Item 430.B.1 from the 2000 Appropriations Act. The objective of Item 430.B.1 is to inventory selected agency computer systems in order to obtain a representative sampling of the technologies being used throughout the Commonwealth. Having this inventory establishes a technology baseline that can be used to improve integration among the agencies. This assessment is not intended to present the value of integrating criminal justice systems, as that was previously addressed in the Business Case for Virginia Integrated Justice (March 14, 2001).

The road to an integrated criminal justice system environment begins by defining the current state and plans for current information systems operated across the various executive and judicial agencies within the Commonwealth. This report is intended to establish a starting point by summarizing the status of the agency information systems, developing a high-level approach for integrating these systems, and estimating the costs to accomplish this integration. The assessment will describe the condition, capacity, and status of computer systems and databases in use by law enforcement, commonwealth attorneys, courts, local and regional jails, juvenile detention facilities, State Police, Corrections, Juvenile Justice, and Criminal Justice Services.

In support of the requirements of Item 430.B.1 from the 2000 Appropriations Act, an interim report was provided to the Chairman of the Senate Finance and House Appropriations Committees and the Chairman of the Crime Commission on December 1, 2000. This report is updated to include additional information including rough estimates on the cost of integrating Virginia's criminal justice systems.

This assessment recognizes that the content, completeness, and quality of data in current criminal justice information systems must be improved to meet the user needs of these systems. Although integration will require certain modifications to the content of these systems (mainly the adoption and use of unique, system-wide identifiers for individuals and cases), the scope of the current integration effort is focused on enhancing the sharing of criminal justice information. Although improvements in data quality will occur as data sharing is improved, improving the overall content and quality of data contained in these systems will require a major initiative that is beyond the scope of the current integration effort.

The assessment targets the impact of integrating Virginia Commonwealth systems over the next five years, although the actual implementation could extend beyond that period because of budgetary considerations. The impact assessment addresses the effort to package, send, and receive data across the participating agency systems. Included is the work to update local databases with data received electronically from the remote systems.

1.2 Document Overview

Introductory information for this report is presented in Section 1. The purpose of this report, the background that forms the basis for the report, and the scope of the report contents are briefly discussed. This section also contains a listing of the reference documents used in the preparation of this report.

Section 2 describes the state of the current agency systems, specifically the hardware platform and operating system that the agency uses, the database hosted on the platforms, the major interfaces, and any planned upgrades.

The current Implementation Plan for the integration effort is described in Section 3. Phases of the plan are described, and the implementation activities are listed.

Section 4 describes the architecture alternatives that were considered for the integration effort. This section is presented to provide a context for impacts described later.

Section 5 describes the process used to estimate the impacts to agency systems.

Section 6 contains summary impact assessments by agency; while more details of impacts to each system appears in Appendix D.

Appendix A contains the report authority from the 2000 Appropriations Act..

Appendices B and C contain systems information collected from the agencies.

Appendix E contains the listing of referenced documents.

1.3 Background

Improvements to the Magistrate system have been planned and will be implemented in time to coordinate with the integration effort. Many of the improvement efforts to the Magistrate system will relate to the implementation of a Commonwealth-wide uniform Offense Tracking Number (OTN), while others will be independent of the integration effort. The current Magistrate system is hosted on a personal computer (PC) operating in a standalone environment where charges are entered and warrants and orders are printed. Charges are saved to a floppy disk and imported into the Case Management System (CMS) of the Courts Automated Information System (CAIS) to reduce data entry errors and save time when a defendant is arraigned. The reengineered Magistrate system will generate an OTN and will utilize a uniform charging table. The new system will include a central database and communications will be upgraded to electronically transfer charges to the CMS without manual floppy transfer. The new Magistrate system will have the following characteristics:

- New data structures will be based on standards approved for a statewide criminal justice data dictionary.
- The graphical user interfaces will be replaced or enhanced to reflect the OTN and other data structure changes.
- Charges will be transmitted from magistrates to a central database in real time.

The centralized database is important because it eliminates the need for the integration effort to provide an interface to each of the standalone Magistrate PC databases to retrieve charge data.

In order to coordinate all of the affected systems, a central messaging hub will be required to facilitate the transfer of data. The central hub communicates to the servers of the systems to be integrated and becomes an integral part of the infrastructure. Users on the various Commonwealth systems will access other systems through their own server systems. Direct communication to individual users' PCs or workstations by the messaging hub would not be the normal access method.

The OTN, the centerpiece of the Charge Standardization Program (CSP), will be promulgated across all Virginia criminal justice systems with integration system interfaces. The CSP will have a Central Registry for the recording of OTNs, and OTNs will have been fully implemented by participating agencies. For this to be accomplished, procedures for using OTNs must be firmly established, the local system databases modified, OTNs added to the charge documents, and OTNs registered in the central database.

A network architecture consisting of an interface backbone will be implemented and linked with the affected Virginia criminal justice systems. This assessment addresses the impact to the various criminal justice agencies of accessing the messaging hub through this network. Since it is the intention of the DCJS to make the integration system implementation as non-intrusive as possible to existing Virginia criminal justice systems, it is possible that the existing Virginia Criminal Information Network (VCIN) may be used as the backbone communications infrastructure. This system currently serves as the criminal justice message switch and serves almost 4200 workstations throughout the Commonwealth. The integration system will minimize redundant data entry and will rely on electronic transmission of information among the participating agencies.

It should be noted that there are a number of point-to-point interfaces in place through which Virginia's criminal justice agencies share data. In addition, the State Police collects data from a variety of criminal justice agencies and maintains it in a repository that is accessible by Virginia criminal justice agencies. Criminal history data maintained by state police is supported by fingerprints, and is heavily relied upon by criminal justice agencies throughout the state. Although the interfaces and repository have been very successful, there are still many fundamental issues that need to be addressed. These issues are described in the *Business Case for Virginia Integrated Justice*, and include redundant data entry, data integrity and quality of source data, opportunities for improving the efficiency of underlying criminal justice processes, or data sharing between other criminal justice agencies. The impacts of these and other issues are the focus of a broader system integration effort that is assessed in this report.

1.4 Scope

This report addresses the impact to current Virginia criminal justice information systems to implement an integration system based on the environment described in Section 1.3. The assessment covers hardware upgrades, commercial software additions or upgrades, and labor resources required. All of the estimates are done as ranges, because actual prices would most likely be negotiated, solicited competitively, or obtained from the Virginia Commonwealth contract for consultant services. Labor is estimated in terms of dedicated personnel.

The systems that are evaluated include the following:

- Supreme Court of Virginia – Magistrate system, CAIS
- Virginia State Police – Central Criminal History (CCH), Wanted Persons, Booking Systems (Livescan)
- State Compensation Board – Local Inmate Data System (LIDS)
- Department of Juvenile Justice – Juvenile Tracking System (JTS)

- Department of Corrections – Virginia Automated Comprehensive Correctional Status Information System (VACCIS), Offender Based State Correctional Information System (OBSCIS), Pre-Sentence Investigation (PSI)
- Local Jurisdictions – Criminal Case Management Systems, Jail Management Systems
- DCJS – Pre-Trial Services Community Correction Act, Forensic Science DNA Database

The report also addresses the impact for implementing an integration effort at each of the evaluated systems using one of three infrastructures:

- Using a message-oriented middleware product
- Using a Virtual Database
- Developing software for a gateway

For this report, a hybrid approach is used which relies on utilizing message-oriented middleware software on the larger systems and using a gateway that connects to a central message hub for the smaller systems. While not included in this hybrid architecture because of limited availability of mature products to evaluate, virtual database architectures may be used in future implementation scenarios.

Six integration feature/functions are planned for implementation. This report addresses the impact for implementing the following functions in the next five years:

- Push/Pull – Push is the sending out of data to users and pull occurs when users receive the data only when requested.
- Query – The searching for data in a database
- Person and Case Linking – When an event triggers an action or message

The following feature/functions are most likely to be implemented in a post-project era of implementation (beyond five years) and are not addressed:

- Publish – two-tier options
  - Posting data for use by subscribers
  - Notifying subscribers of the data when a change is made
- Event Subscription/Notification – A user is said to subscribe when he requests access to published data; when published data is changed, the user is notified
- Aggregate Analysis – Data warehousing applications so that disparate data can be collected and analyzed

Once the infrastructure changes indicated above are made to the Commonwealth's criminal justice environment, individual criminal justice programs, systems or processes will be positioned for even further updates and changes. These future changes, some perhaps revolutionary, will be leveraged from the infrastructure improvements discussed above. Since these changes cannot be accurately foreseen at this time, they are not addressed in this report.

1.5 Referenced Documents

In the preparation of this report, the following documents were used as reference:

- ICJIS Charge Standardization Project: Phase I Business Case
- Virginia ICJIS Architecture
- Business Case for Virginia Integrated Justice
- Interim Assessment of Criminal Justice Computer Systems
- Status of Information Systems in the Commonwealth of Virginia Criminal Justice Agencies

A full bibliography of these documents is contained in Appendix E.

Section 2 – Current Computer Systems and Databases

Although there are numerous interfaces in place between the agencies, the Virginia criminal justice community is operating from a legacy of computer systems designed to support a specific group of users to fulfill a specialized set of mission requirements. Naturally, each agency across the Commonwealth has focused on developing the systems needed to support its own users and mission requirements. As a result, a wide variety of database technologies and products have been used to implement these systems over a period of many years.

To quantify and illustrate this, an assessment of the computer systems was undertaken to gather up-to-date and accurate information regarding the status of these systems. The assessment was conducted in a phased manner and consisted of the following steps:

- Review the "Status of Information Systems in the Commonwealth of Virginia Criminal Justice Agencies." Although this report is five years old, much of the information in this report is still accurate and relevant.
- Review documentation from the agencies to gather specifics on the technical characteristics of their systems.
- Conduct interviews with agency subject matter experts to capture information regarding their systems, business processes, and external interfaces.
- Review results of a detailed technology survey that was conducted with selected state and local agencies to gather information on the status of their systems and databases.
- Analyze the results of the survey to determine the current condition of systems.

From this assessment, the condition, capacity, and status of these systems were identified. Exhibit 2-1 highlights the attributes, found through the assessment, of six Commonwealth systems.

As the table demonstrates, the Commonwealth has made a large investment in a diverse set of technologies over the years to meet the mission objectives of the respective agencies. These systems include both older and newer vintage technologies. In general, the systems are functional and have adequately met the Commonwealth's needs and should continue to do so in the future.

From an integration perspective, several agencies have developed interfaces with other agencies to exchange data for specific purposes. For example, the Supreme Court of Virginia has established interfaces with the Virginia State Police, Department of Motor Vehicles, and the Department of Juvenile Justice to exchange disposition data in an automated manner. This information is invaluable to the business processes of the receiving agencies. Additionally, several agencies have efforts underway to improve the manner in which information is shared. The Department of Corrections is moving forward with the implementation of the Integrated Correctional Information System, and the Supreme Court of Virginia continues with their DB2 upgrade.

Agency	System	OS and Database	Major Interfaces
State Compensation Board (SCB)	Local Inmate Data System (LIDS)	IBM DB2	DOC, Local Jails
Department of Juvenile Justice (DJJ)	Juvenile Tracking System (JTS)	RS/6000 Oracle	SCV
Supreme Court of Virginia (SCV)	Magistrate General District Court (GDC) Juvenile Domestic Relation Court (JDR) Circuit Court (CC)	M/F VM/VSE VSAM/DL (upgrade to DB2)	VSP, DOC, Department of Motor Vehicles (DMV), DJJ, Magistrate
Department of Corrections (DOC)	Virginia Automated Comprehensive Correctional Status Information System (VACCIS) Offender Based State Correctional Information System (OBSCIS) Time Information Processing System (TIPS) Pre-Sentence Investigation (PSI)	M/F MV IMS & DB2	SCV, VSP, DSS, VSC, Census, TRIGON, MCI, DCE, MCV, IRS, SSA, INS, PMIS, CIPPS, CARS, PROBUD, VINE,
Virginia State Police (VSP)	Central Criminal History (CCH) Wanted Persons Concealed Weapons Mental Containment Protective Orders Statute Table Incident Based Reporting (IBR)	Unisys 2200/5211 DMS 1100	SCV, DMV, DOC, Livescan, NCIC, NLETS, NICS, DIT, IAFIS, VA Game & Inland Fisheries, State Corporation Commission, 45 Local Systems
Department of Criminal Justice Services (DCJS)	Pre-Trial Services Community Correction Act DNA Database	Windows NT Microsoft SQL Server V 6.5, Microsoft Access 2000	SCB, DOC, SCV, VSP, DMV

Exhibit 2-1. Commonwealth Systems Presently in Use

Even though some level of integration is underway, most agencies are not presently upgrading their systems and are not readily sharing information with one another in an automated manner. In general, many of these agencies are hampered by the technology currently in operation. For example, some agencies are still using hierarchical databases that do not offer the strengths of relational database technologies. Even though hierarchical databases are efficient and inherently fast, they do not offer the level of flexibility that is required to satisfy the changing demands of an integrated environment. Additionally, many of the hardware platforms in use by agencies are somewhat dated, which can cause maintenance issues. These systems have evolved over several decades but have not kept pace with the rapid advances in technology. Considering that hardware performance doubles every 18 months, these platforms are several generations behind the latest technologies. As a result, agencies are dealing with issues that are impacting their day-to-day operations. These issues are categorized as follows:

- Retention of qualified personnel
- Increase in maintenance costs
- Increase in system "down times"
- Degradation in performance
- Complexity in adding functionality
- Inability to expand system capabilities

With the existence of many disparate and older operating platforms, the criminal justice system is experiencing problems and shortcomings handling information in an integrated manner. There are many cases in which different agencies attempt to capture and maintain the same data resulting in redundancy. In other cases, one agency may not have access to, or even be aware of, the existence of potentially useful information held in another agency's database. This results from the "silo" effect, where potentially valuable information is locked or unavailable to other agencies needing it. Even when two agencies are interested in sharing information, differences in systems, database formats, and/or retrieval keys may hamper the information sharing process.

The critical point to understand is that the design of the existing information systems is closely coupled with the design of the human business processes those systems support. In most cases, the operational interfaces of these systems are woven into the day-to-day activities of the agency staff. Over time, the information systems and business processes become more entrenched by policy and technology, which promotes the silo effect even further.

To address these issues, an integration approach must be considered which incorporates new technologies, leveraging from existing information systems and business processes. The objective is to improve on the information exchange paradigm by removing the causes for the silo effect while minimizing the financial and operational impacts on the agencies. The following section summarizes this approach.

Section 3 – Implementation Plan

The approach to integrating systems across the Commonwealth is based on the premise that there is no need to start from scratch. The Virginia criminal justice community has built up a legacy of effective information systems and business processes that are woven into the day-to-day operations of the agencies and the staff they support. To achieve the integration objectives, it would be unnecessary and unwise to consider wholesale replacement of these systems and processes with something entirely new. Any changes to be made will build on what has already been accomplished, rather than uprooting the existing environment.

Based on the analysis done to date on the technologies and business processes, it is envisioned that a gradual, incremental approach to integration is preferable to a *big bang* approach. This will reduce program management risk and system engineering risk, as well as reflect a realistic allocation of personnel and funding resources. It is understandable that any plan at this stage is subject to change, but a framework plan is necessary for the incremental approach so that decision makers have a context and a baseline from which to work. This framework plan will bound the scope of the integration effort from a technical and financial perspective, set expectations as to the direction of the effort, and provide a basis for estimating costs. The implementation plan described below incorporates a great deal of flexibility and gives the reviewer a good idea as to the overall proposed approach.

It is envisioned that the integration effort will be implemented in phases. Initially, the focus will be on planning, where the technical and programmatic groundwork will be established to make the implementation possible. As of this writing, this effort is well underway and includes the following activities:

- Common Data Dictionary – Document data currently captured in digital form by Commonwealth criminal justice agencies, highlight data items required by multiple agencies, and establish standards for this data.
- Business Case – Document the business case for implementation of the integration vision by identifying problems that can be solved while quantifying and illustrating the benefits of solving those problems. (Completed March 14, 2001)
- Program Management Plan – Document the methodologies that will be used to plan and manage the integration effort in order to implement the vision within budget constraints and according to schedule. Detailed plans and budgets are currently in progress.
- Charge Standardization Project – Develop a plan to provide integration services to the various criminal justice agencies through the Magistrate System operated by the Supreme Court of Virginia. This initiative is the cornerstone of the integration effort since the Magistrate System is the normal starting point for the entry of charge data on individuals. The Charge Standardization Project will include the implementation of unique OTNs and the use of a uniform charging table.

Following the planning activities, a systems development effort will commence. This will consist of developing functionality that will facilitate the integration of agency systems. The core integration services will consist of querying, pushing, and pulling data to/from other agencies; automatically notifying agencies of important events; searching a data warehouse/repository; and implementing security and privacy controls. This effort will occur over several years, as agency systems will be upgraded incrementally based on an agreed-on implementation plan.

In support of this effort, agencies will be required to add gateway software in order to access and obtain the integration services they desire. By agreeing to participate in the integration initiative, an agency is by definition agreeing to bear some level of impact within their system that houses their data. It is envisioned that these core services will be implemented incrementally from one agency to the next over the duration of the integration effort.

Having established the core integration services, a baseline infrastructure with key agency system interfaces will have been implemented, and major benefits will have begun to be realized by the community of users. These benefits include reducing data entry duplication, accessing and exchanging up-to-date information with all criminal justice agencies, and improving agency operational efficiencies through automation.

At the conclusion of the development effort, the focus will shift to maintaining the integrated environment, evaluating emerging technologies for expanding functionality, participating in national initiatives to improve the information sharing process, and coordinating agency upgrade efforts.

Section 4 – Integration Architecture Alternatives

The integration system architecture components are designed to support a number of long-range objectives. The components provide support services, agency access, applications specific to the integration effort, data warehouse applications, and publishing applications.

Support services provide database management and security and privacy controls. These services serve as the basis for all of the other integration applications. Agency access allows one agency with proper permissions to access data at another agency. This access can be pushing or pulling data to the target agency, or performing online queries against the target agency's database. Typical integration applications currently envisioned are person and case linking and event subscription and notification, but other integration-specific applications are possible. Data warehouse applications capture select data items over a period of time and store them in a separate database. This allows various analytical techniques to be used on operational data without impacting the operational systems. Publishing applications allow data to be collected at a web site for use by other agencies or even for access by the public.

Three architecture alternatives were explored for the integration system architecture; they are as follows:

- Message-Oriented Middleware – Provides a reliable system, passing messages among servers that may contain data or provide triggers for other activity
- Virtual Database – Provides a transparent method of accessing data across disparate systems, with the virtual database software providing the conversion services as required
- Gateway – Provides a window from one system into another system's database

After careful consideration of the systems that need to be integrated, it was concluded that a hybrid approach offers the best solution for creating an integrated system. The hybrid approach relies on commercially available message-oriented middleware software on the larger systems and custom gateway software that connects to a central message hub for the smaller systems. The larger systems benefit from the robust and reliable messaging support provided by the middleware, while the smaller systems are not able to support the overhead required by the middleware. The specifics of each approach are explained in the following sections.

4.1 Message-Oriented Middleware

In the message-oriented middleware solution, a commercial middleware product is used. With this product, DCJS or the system owners can develop services on the agency systems and exchange data with other agencies reliably.

There are several potential middleware products that run on all platforms currently in use by criminal justice agencies. Message-oriented middleware provides capabilities to allow agencies to develop data access services and to communicate with each other via these services. Middleware is intended for a distributed environment connected via Transmission Control Protocol/Internet Protocol (TCP/IP), and is well suited to the Virginia network architecture.

Some of the advantages of middleware are that it provides built-in reliable communications capability, and the client-side libraries for all agency hosts are available at no cost.

Disadvantages include the initial license cost and yearly maintenance costs, and each agency must develop interface software for data access using the provided libraries.

A diagram of agency access using middleware is shown in Exhibit 4.1-1. This diagram is taken from the Business Case for Virginia Integrated Justice, where it is explained in detail.

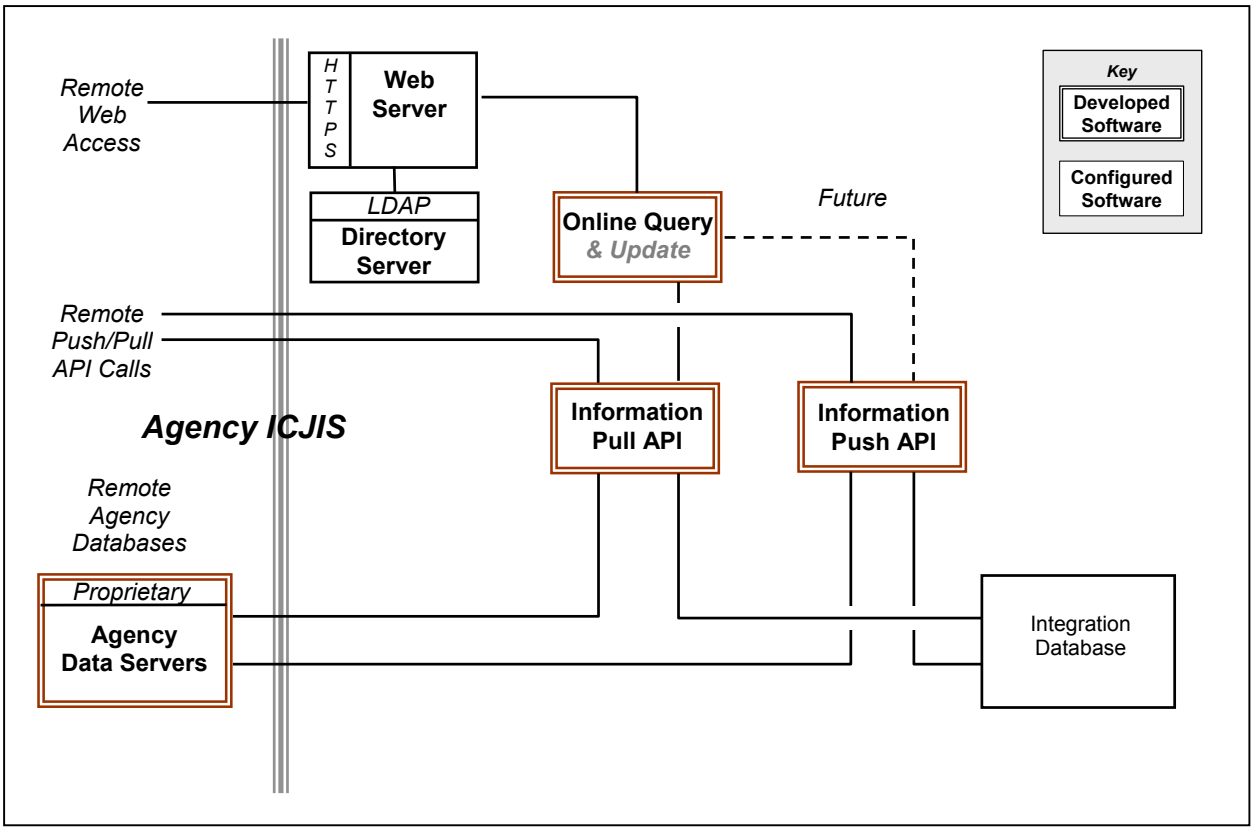

Exhibit 4.1-1. Agency Access Using Middleware

4.2 Virtual Database Approach

In the virtual database approach, an integration server is used to translate the target system data elements into a single uniform system of data definitions. Read and write access requests are seamlessly translated and transferred smoothly and simultaneously. Database queries can span multiple databases simply by accessing the virtual database. A potential virtual database is the Callixa Integration Server, which would allow agencies access to other agency databases through the Integration Server. The Integration Server would use native network Database Management Environment (DBMS) interfaces, Open Database Connectivity (ODBC), Java Database Connectivity (JDBC), and proprietary network interfaces, such as Information Builder Inc.'s EDA/SQL and Cross Access to translate the request to the target systems.

Some of the advantages of a virtual database are that it utilizes a uniform data dictionary for inter-system access and it allows queries to be made across systems transparently.

Disadvantages include the initial license cost and yearly maintenance costs, and the need for an additional server at a central site that could be a source of bottlenecks.

A diagram of agency access using a virtual database is shown in Exhibit 4.2-1.

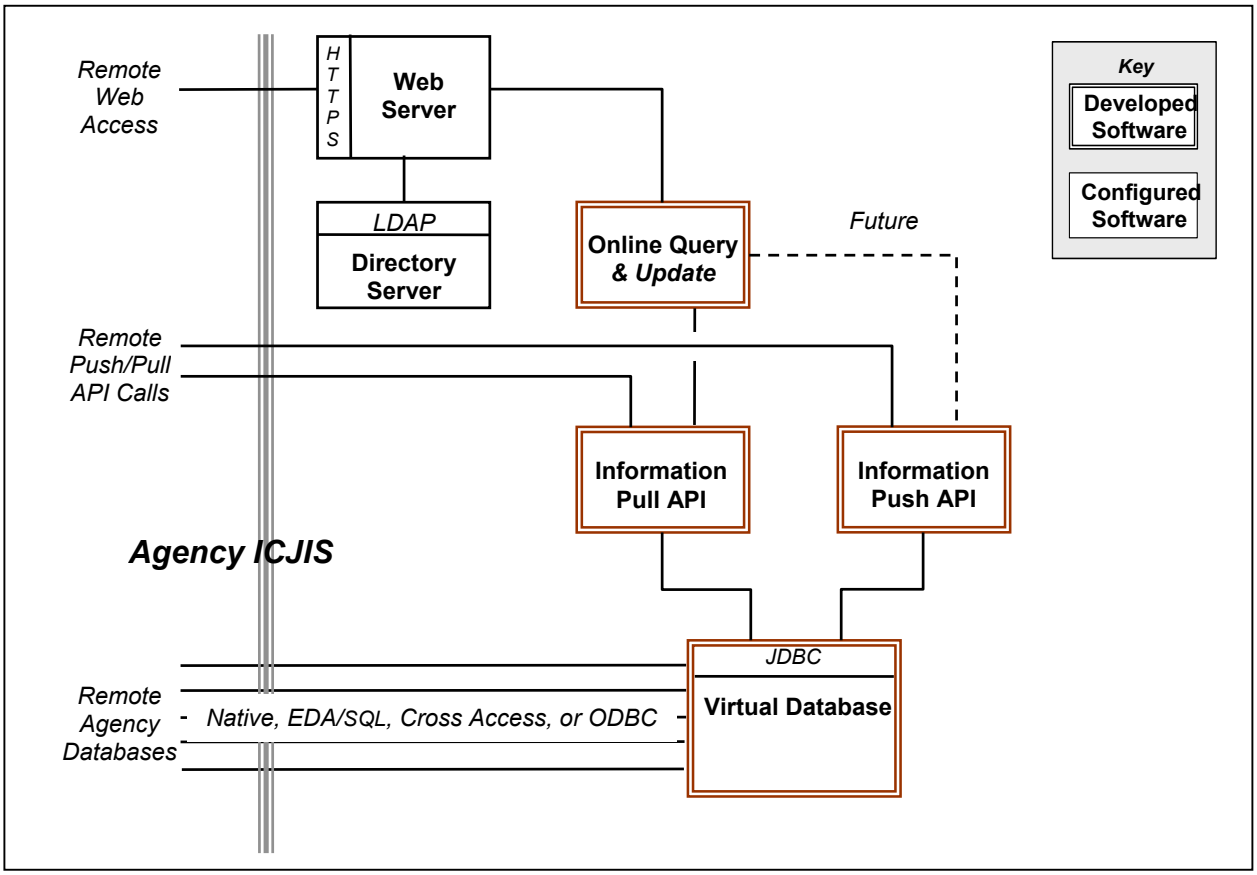

Exhibit 4.2-1. Agency Access Using a Virtual Database

4.3 Gateway Approach

The gateway approach has a topology similar to the virtual database with one important difference. While the virtual database translates the target system data elements into a single uniform system of data definitions, the gateway allows access but performs no data translation. Each agency wishing to access another agency's data must know the specific format and characteristics of the target system data. Read and write access requests are relayed only through the gateway. Any translation required to render the data into a usable format must be done by the requesting agency. Database queries that span multiple databases must be done as separate queries. The gateway software would typically be written by the agencies accessing the data.

Some of the advantages of a gateway are that it requires no additional software, hence there are no license costs or yearly maintenance fees.

Disadvantages include the requirement that each system accessing another system has to have detailed knowledge about the target sites construction, and maintenance can be a problem, because any changes in the target system have to be recognized in all of the accessing systems.

A diagram of agency access using a gateway is shown in Exhibit 4.3-1.

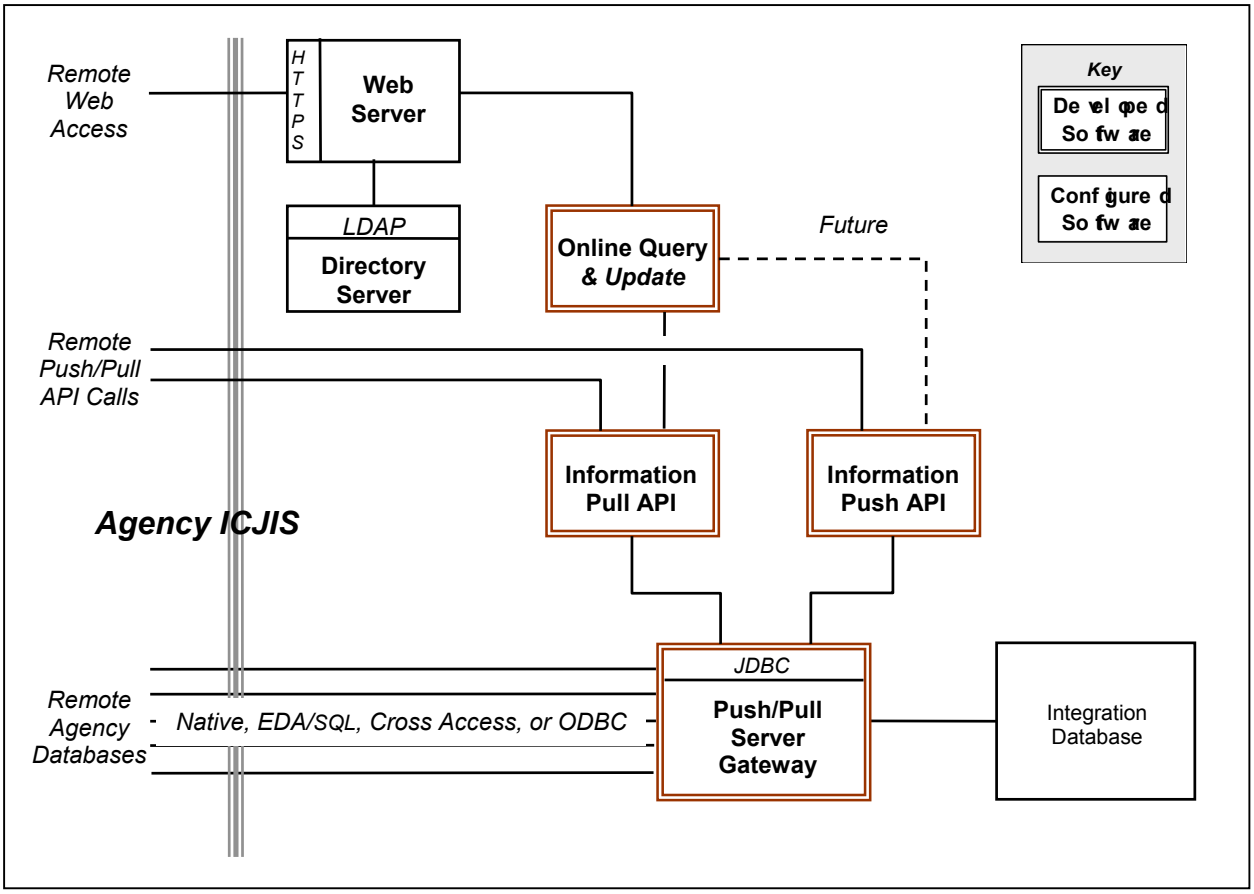

Exhibit 4.3-1. Agency Access Using a Gateway

Section 5 – Methodology for Estimating Impacts

A uniform method was used to assess the impacts to the existing Virginia Commonwealth systems to integrate the independent systems. Each system's specification was examined to decide whether the message-oriented middleware solution or the gateway was the most appropriate interface mechanism. (See Section 4, Integration Architecture Alternatives, for a description of the two methods selected for interfacing.) Once the interface mechanism was selected, the requirements for additional hardware and software for representative solutions were determined, and that information was recorded in the system assessment tables in Appendix D. In order to estimate the labor required, the following steps were used:

- Developed a work breakdown structure for the integration effort. If a work breakdown structure already existed for the effort as part of the Charge Standardization Project, then the elements that relate to the integration effort in the existing work breakdown were used.
- Mapped the work breakdown structure elements to the integration project plan and work plan to extract the duration for the integration effort elements.
- Assigned a complexity (high, medium, low) and a risk factor (high, medium, low) to developmental elements in the work effort.
- Estimated the number of lead, senior and mid-level personnel required for each work breakdown element.
- Added a Commonwealth agency workload factor for oversight, participation and coordination of supporting contractor efforts
- Entered the summed data into the system assessment tables in Appendix D.

Using this impact methodology, approximate material and labor requirements for each interface were determined. As a final check, the labor estimates were compared to Boehm's Constructive Cost Model (COCOMO) estimating techniques for large software projects. Based on the COCOMO model, the allocation of labor to the phases of the lifecycle was adjusted in the final estimates. To arrive at cost, representative labor rates were used for each of the personnel skill levels listed above. The commercial software costs were estimated based on the systems identified as using message-oriented middleware. The estimates presented are approximate and can be refined as more details of the integration effort become available.

Section 6 – Impact Assessment

This section shows the resources required to implement the integration system described in Section 3. The impact to each of the Commonwealth's agency systems is separately described, in table format. These tables all show the following information:

- Proposed Architecture – Shows the architecture proposed for the agency system.
- Proposed System Enhancements – Lists the changes proposed to be implemented by the agency system.
- Hardware Resources – Lists the hardware that would need to be acquired for the agency system to implement the integration solution.
- Software Resources – Lists any Commercial Off-the-Shelf (COTS) products that would need to be acquired for the agency system to implement the integration solution.
- Labor Resources – Shows the estimated labor required for the agency system to implement the integration solution (as described in Section 4). Labor estimates are expressed in both man-days and man-years and are divided into the following Work Breakdown Structure (WBS) categories:
  - Management – Labor estimates to manage the integration implementation for the agency system
  - Engineering – Labor estimates to develop and maintain project plans, requirement definition, and data standardization
  - Design – Labor estimates to design the modifications required for the agency system to implement the integration solution
  - Development – Labor estimates to implement the integration solution on the agency system
  - Testing – Labor estimates to test the integrated systems prior to deployment

The commercial software costs for a message-oriented middleware product cannot be itemized without providing detailed hardware specifications to the vendor. However, comparable projects using software similar to that specified have had initial year purchase costs ranging from $500K up to $1M, with yearly license fees at about 15% of initial purchase cost. Some additional telecommunications costs would be incurred for connectivity to the central message server, and these are expected to be in the range of $875K. Labor costs for the integration effort will vary depending on the specific negotiated labor rate, but, based on the labor estimates in the following sections, labor costs should be in the range of $11.8M up to $16.8M. This would yield a total program cost ranging from $13.2M up to $18.7M.

Although these estimates were derived by a totally different estimating methodology, the range is consistent with a previous independent estimate dated May 1, 1997 by TASC (The Analytic Sciences Corporation). The estimates also are consistent with the range of nine different proposals received from contractors interested in implementing an integrated system described in an RFP issued March 12, 1999 for a project of comparable scope.

6.1 Summary of Integration Impacts by Organization

Exhibit 6.1-1 summarizes to each of the affected organizations the impact of implementing an integration system. The details of the impacts are contained in the description of each system that follows this summary.

Agency	Hardware/Software	Labor (Man-Year)
Department of Juvenile Justice	Message Broker – Server Version	3.74
State Compensation Board	Message Broker – Server Version	4.07
Supreme Court of Virginia	Message Broker – Server Version	7.58
Department of Corrections	Message Broker – Server Version	13.67
Virginia State Police	Message Broker – Server Version Gateway Software	17.32
Department Criminal Justice Services	Message Broker – Server Version Sun Server	15.38
Local Case Mgmt. and Jail Systems	Gateway Software	7.16
Local Record Management Systems	Gateway Software	3.58
Total – All Agencies		**72.5**

Exhibit 6.1-1. Summary of Integration Impacts by Organization

6.2 Limitations

The impact assessments presented in the Appendix D, Assessments of Impacts to Agency Systems, were developed using the methodology described in Section 5. The agencies owning the systems provided information during this assessment process, but they have not reviewed the estimates in detail nor have they approved the estimates provided. In addition, it should be noted that the planning activities described in Section 3, while well underway, are not complete nor are corresponding budgets elements approved; therefore the impact assessments which follow may be subject to change as the planning activities proceed.

The major system deployment planning factors, including system integration strategy, geographical dispersal, sites conversion rates, and funding availability, will strongly influence the costs to introduce data integration improvements into localities and field sites. These factors also vary widely between systems and agencies, making the application of standardized cost factors impractical. For these reasons, the assessment does not include system deployment costs, but instead, recommends that part of the assessment be performed at a future date when deployment factors are better known.

Estimates are limited to developing the standards and infrastructure for requirements that have already been identified. Once the ICJIS infrastructure is in place, many additional enhancements are possible. Requirements for these future system enhancements have not been identified and therefore cannot be included in these estimates.

Depending on the strategy used for linking local systems, there may be additional costs for them to either modify their systems or write interfaces in accordance with ICJIS specifications in order to take full advantage of ICJIS data exchanges. Establishing standards and gateways for localities to use will allow them to relay read and write access requests through the gateway, but they

would still need to make translations between their systems and the standard format. Most record management systems for localities are developed and maintained by COTS (Commercial Off the Shelf) vendors. Although it should not be prohibitively expensive to make modifications to these systems to take full advantage of ICJIS capabilities, there is not enough information currently available to make meaningful estimates of these costs.

Appendix A

Report Authority from 2000 Appropriations Act

Appendix A – Report Authority from 2000 Appropriations Act

Secretary of Public Safety (187)

Item 430.

Authority: Title 2.1, Chapter 5.3 and §2.1-51.10:1 Code of Virginia.

A. The Secretary shall present revised juvenile and state and local responsibility adult offender population forecasts to the Governor, the Chairmen of the House Appropriations and Senate Finance Committees, and the Chairmen of the House and Senate Courts of Justice Committees by October 15, 2000, for each fiscal year through FY 2005 and by October 15, 2001, for each fiscal year through FY 2006.

B.1. The Secretaries of Public Safety, Technology, and Finance, or their designees, in consultation with the Virginia State Crime Commission, the Executive Secretary of the Supreme Court, the Virginia Criminal Sentencing Commission, and the Compensation Board, shall assess (a) the condition, capacity, and status of criminal justice computer systems and databases in use by (i) law enforcement, Commonwealth's Attorneys, and the courts; (ii) local and regional jails and juvenile detention facilities; and (iii) the Departments of State Police, Corrections, Juvenile Justice, and Criminal Justice Services; and (b) the estimated costs of integrating criminal justice computer systems, including existing and future systems. The Secretaries shall provide an interim report to the Chairmen of the Senate Finance and House Appropriations Committees and the Chairman of the Crime Commission by December 1, 2000, and a final report by June 30, 2001.

2. The Virginia State Crime Commission, in consultation with the Secretaries, the Executive Secretary of the Supreme Court, the Virginia Criminal Sentencing Commission, and the Compensation Board, shall recommend how best to coordinate the development of an integrated information system for all criminal justice computer systems that allows for the common reporting and sharing of information, while eliminating duplicate information in individual agency systems, and how best to fund future criminal justice computer systems and databases. The Crime Commission shall also recommend standards for collecting and sharing data; eliminating redundant data collection; and linking offender and case records across multiple databases. The intent of these standards is to provide information needed by the users of criminal justice information systems in the most timely and efficient manner possible. Upon request by the Crime Commission, the Auditor of Public Accounts shall provide information and assistance as needed. The Crime Commission shall complete this assessment and provide a final report to the Chairmen of the Senate Finance and House Appropriations Committees by December 1, 2001.

Appendix B

Local Criminal Justice Information Systems

Appendix B – Local Criminal Justice Information Systems

Appendix B summarizes the condition, capacity, and status of local computer systems and databases for agencies, based on information received from the agencies. Detailed survey results can be obtained from DCJS.

B.1 Law Enforcement

Because of the expense associated with maintaining a staff to support and revise public safety systems, most localities that formerly developed their own systems (Norfolk, Richmond, Virginia Beach) are installing systems purchased from private firms. Most Virginia localities have purchased systems from one of the following vendors: DaPro Systems, DM Data, OSSI, Shield Technology, Southern Software, Vision Software, or United Systems Solutions. As Computer-Aided Dispatch (CAD) system costs have decreased in recent years, most mid-sized and large agencies have implemented integrated CAD and records management systems. Many localities are attempting to interface CAD/records management systems with local mapping systems to more easily identify crime trends and appropriately allocate resources.

B.2 Commonwealth Attorneys/Public Defenders

There is a Commonwealth Attorney case management system developed in Lotus Notes and sponsored by the Commonwealth Attorneys Services Council that is made available to Commonwealth Attorney and public defender offices across the state. This system is currently in use by over 20 offices, and additional installations are planned over the coming year. Other Commonwealth Attorney offices either use systems that were developed locally or keep their case management records manually. There is currently no expectation that all Commonwealth Attorneys will eventually adopt the same system for case management.

B.3 Local Jails

Most localities use packaged jail management software that has been modified to suit their needs. The State Compensation Board has worked closely with jail management system vendors (DaPro Systems, DM Data, DSI, Gateway Software, OSSI, Southern Software and Vision Software) to help them develop Local Inmate Data System (LIDS) modules for their systems. Most of the public safety systems vendors doing business in Virginia offer a suite of products that are integrated, so that duplicated data entry or lack of interfacing are not problems. United Systems Solutions, which has approximately 50 user sites in Virginia, does not currently offer a jail management system, but partners with DSI to provide localities needing integrated CAD, records management, and jail management systems with an integrated environment. Very few localities operate systems that have been developed locally.

B.4 Regional Jails

DSI and DM Data Systems dominate the market for regional jail systems in Virginia. Most regional jails operate standalone jail management systems that do not interface with other local systems. However, some regional jails, such as the Blue Ridge and Rappahannock Regional Jails, operate jail systems that are interfaced with local law enforcement records management systems via regional networks.

B.5 Juvenile Detention Homes

Local detention homes for juveniles use a variety of methods for facility records management. Detention homes have access to the Intake System of the Juvenile Tracking System maintained by the Department of Juvenile Justice, but many functions related to managing the facility, such as food inventory management, are not supported through the Intake System. Although there are several vendors who have systems for managing detention homes, very few homes have made a decision to purchase these systems. Record systems at most homes are completely manual, but some have developed software on their own or have adapted general-purpose software to meet their basic needs. The Virginia Council on Juvenile Detention is currently conducting an assessment of computer systems used by juvenile detention homes that should provide more detailed information when their report is completed.

Appendix C

State Criminal Justice Information Systems

Appendix C – State Criminal Justice Information Systems

Appendix C describes the condition, capacity, and status of computer systems and databases for agencies based on the information received from surveys. The detailed survey results can be obtained from DCJS.

Agency	System	System Attributes
Department of Juvenile Justice (DJJ)	Juvenile Tracking System (JTS)	Year system was developed: 1996 Language: Oracle Developer 2000 6.1 Database: Oracle 7.3.4 & 8i OS: AIX 4.2.1 & LINUX 6.2 Network: TCP/IP ODBC Driver: Oracle 7.3 ODBC Web: Dreamweaver 3, IE, & Cisco Pix firewall Total # of Users: 700 # of Agencies tied to TCP/IP Network: 200 Keys: Computer generated sequential unique # & VCC codes
State Compensation Board (SCB)	Local Inmate Data System (LIDS)	Year system was developed: 1996 Database: DB2 5 OS: OS/390 2.5 & CICS 4.1 Network: TCP/IP 4.1, SNA, VTAM 4.4 Total # of Users: 2,500 Keys: SSN, Alias SSN, CCRE, DOC Inmate #, Jail #, Commit date/time, offense code/date/sequence #
Supreme Court of Virginia (SCV)	Magistrate	Year system was developed: 1995 Language: PowerBuilder Database: DB2 6.1 & SQL Anywhere OS: Windows 95 & TPX Network: TCP/IP & Windows NT Server Web: Cisco Pix Total # of Users: 400 # of Agencies tied to TCP/IP Network: 93 Keys: Name, SSN, DOB, Height, Weight, Race, Sex, Warrant #
	General District Court (GDC)	Year system was developed: 1984 Language: COBOL LE & DMS 4.0 Database: DB2 6.1, DI/1 1.1, & VSAM 6.1 OS: VSE/ESA, CICS 2.3, & Windows 95 Network: TCP/IP, VTAM 4.2, & Windows NT Server Web: Cisco Pix Total # of Users: 1,600 # of Agencies tied to TCP/IP Network: 121 Keys: Name, SSN, DOB, Race, Sex, Case #

Agency	System	System Attributes
Supreme Court of Virginia (SCV)	Juvenile Domestic Relation Court (JDR)	Year system was developed: 1987 Language: COBOL LE & DMS 4.0 Database: DB2 6.1, DL/1 1.1, Windows 95, & VSAM 6.1 OS: VSE/ESA & CICS 2.3 Network: Windows NT Server, TCP/IP, & VTAM 4.2 Web: Cisco Pix Total # of Users: 500 # of Agencies tied to TCP/IP Network: 121 Keys: Name, SSN, DOB, Race, Sex, Case #
	Circuit Court (CC)	Year system was developed: 1985 Language: COBOL LE & DMS 4.0 Database: DB2 6.1, DL/1 1.1 & VSAM 6.1 OS: Windows 95, VSE/ESA & CICS 2.3 Network: Windows NT Server, TCP/IP, & VTAM 4.2 Web: Cisco Pix Total # of Users: 1,000 # of Agencies tied to TCP/IP Network: 121 Keys: Name, SSN, DOB, Race, Sex, Case #
Department of Corrections (DOC)	Virginia Automated Comprehensive Correctional Status Information System (VACCIS)	Year system was developed: 1992 Language: CSP 370AD Database: DB2 5 & SQLServer OS: OS/390 2.5, MVS, CICS 4.1, &NT 4 Security: ACF/2 Network: TCP/IP 4.1, SNA, & VTAM 4.4 Web: Raptor 4.2 & IE Email: Exchange Total # of Users: 700 Keys: VACCIS #, SID, Inmate #
	Offender Based State Correctional Information System (OBSCIS)	Year system was developed: 1980 Language: SAS 8, COBOL LE, & Easytrieve 6.2 Database: IMS 6.1 & VSAM OS: OS/390 & CICS 6.3 Security: ACF/2 Network: TCP/IP 4.1, SNA, & VTAM Web: Raptor 4.2 & IE Email: Exchange Total # of Users: 5,000 Keys: System provided #, Inmate #, Warrant #, SID, Name, SPRN

Agency	System	System Attributes
Department of Corrections (DOC)	Time Information Processing System (TIPS)	Year system was developed: prior to 1980 Language: SAS 8, COBOL LE, & Easytrieve 6.2 Database: IMS 6.1 & VSAM OS: OS/390 & CICS 6.3 Security: ACF/2 Network: TCP/IP 4.1, SNA, & VTAM Web: Raptor 4.2 & IE Email: Exchange Total # of Users: 5,000 Keys: Inmate #
	Pre-Sentence Investigation (PSI)	Year system was developed: 1996 Language: Visual Basic 6 & Data Dynamic Reports 1.1.0.92 Database: IMS 5.1 and SQL Server 7.00.842 OS: OS/390 2.5, CICS 4.1, WNT 4 Network: TCP/IP 4.1 & SNA ODBC Driver: SQL Server Web: MS IIS 4, Raptor 4.2, IE, & MS Active Server Pages Email: Exchange Total # of Users: 900 Keys: System generated, Inmate #, VACCIS #, SSN, SID
Virginia State Police (VSP)	Central Criminal History (CCH)	Year system was developed: 1979 Language: COBOL 7R2C Database: DMS 14 R1A OS: OS1100 TIP 1100 45R2 Network: TCP/IP 8R3B Web: Cisco Pix firewall & IE Email: Outlook Total # of Users: 2,000 Keys: SID #, Name, SSN, FBI #, Document Control #, ORI, DOA, Court Case #
	Wanted Persons	Year system was developed: 1974 Language: COBOL 7R2C Database: DMS 14 R1A OS: OS1100 TIP 1100 45R2 Network: TCP/IP 8R3B Web: Cisco Pix firewall & IE Email: Outlook Total # of Users: 4,000 Keys: VIC, Name, Sex, DOB, SSN, FBI #

Agency	System	System Attributes
Virginia State (Police VSP)	Statute Table	Year system was developed: 1995 Language: COBOL 7R2C Database: DMS 14 R1A & MS ACCESS OS: OS1100 TIP 1100 45R2 Network: TCP/IP 8R3B Web: Cisco Pix firewall & IE Email: Outlook Total # of Users: 1,000 Keys: Statute #
	Livescan	Year system was developed: 1994 Language: UNIX scripting & C/C++ OS: OS1100 / TIP1100 45R2, UNIX, & OS2 Network: TCP/IP Web: Cisco Pix firewall Total # of Users: 1,000 Keys: TCN, Name, DCN
	Sexual Offender Registry (SOR)	Year system was developed: 1994 Language: MAPPER 42R1 Database: MAPPER 42R1 OS: OS1100 / TIP 1100 45R2, WNT 4 Service Pack 6 & COOL ICE 2.0.1E2 Network: TCP/IP 8R3B Web: MS IIS WNT 4 SP 6, MS Active Server Pages WNT 4 SP6, MS FrontPage 3.0.2.1330, IE, & Cisco Pix firewall Email: Outlook Total # of Users: 15 & Internet Keys: Registration #, SSN, FBI #, Name, Statute table, NCIC #
	Concealed Weapons	Year system was developed: 1995 Language: COBOL ACOB 7R2C Database: DMS 100 14 R1A OS: OS1100 / TIP 1100 45R2 Network: TCP/IP 8R3B Web: Cisco Pix firewall & IE Email: Outlook Total # of Users: 4,000 Keys: VIC, Court Case #, name, Sex, DOB
	Mental Commitment	Year system was developed: 1994 Language: COBOL ACOB 7R2C Database: DMS 1100 14 R1A OS: OS1100 / TIP 1100 45R2 Network: TCP/IP 8R3B Web: Cisco Pix firewall & IE Email: Outlook Total # of Users: Firearm purchases Keys: Name & Record #

Agency	System	System Attributes
Virginia State (Police VSP)	Protective Orders	Year system was developed: 1994 Language: COBOL ACOB 7R2C Database: DMS 1100 14 R1A OS: OS1100 / TIP 1100 45R2 Network: TCP/IP 8R3B Web: Cisco Pix firewall & IE Email: Outlook Total # of Users: 4,000 Keys: VIC, Court Case #, Name, Sex, DOB
	Incident Based Reporting (IBR)	Year system was developed: 1994 Language: COBOL ACOB 7R2C Database: DMS 1100 14 R1A OS: OS1100 / TIP 1100 45R2 Network: TCP/IP 8R3B Web: Cisco Pix firewall & IE Email: Outlook Total # of Users: 279 agencies Keys: Incident #, Arrest Transaction #, UCR Offense Code, ORI
Department of Motor Vehicles (DMV)	Customer Service System (CSS)	Year system was developed: 1993 Language: Natural 3.1.3 Database: ADABAS 7.1.2 & PREDICT 3.4.2 OS: OS/390 2.9 & CICS 4.1 Security: ACF 6.2 & Natural 3.1.3 Network: TCP/IP 5.2 Total # of Users: 1,400 # of Agencies tied to TCP/IP Network: 80 Keys: Customer #, customer name
Department of Criminal Justice Services (DCJS)	PreTrial and Community Corrections (PTCC)	Year system was developed: 1999 Language: Visual Basic Database: SQL v 6.5 OS: Windows NT 4.0 Total # of Users: 350 Keys: VCC Codes, Name, SSN
	DNA	Year system was developed: 1996 (system to be rewritten) Language: Access 2.0 OS: Windows NT Total # of Users: In-house Keys: SSN

Appendix D

Assessments of Impacts to Agency Systems

Appendix D – Assessments of Impacts to Agency Systems

D.1 Impact Assessment on Court Automated Information System (CAIS)

Exhibit D.1-1 shows the resources needed to enhance the existing CAIS, operated by Supreme Court of Virginia, in order for it to participate in the integration system solution.

Proposed Architecture	Message Broker (e.g., COTS middleware)		
Additional Hardware Resources	None required		
Additional Software Resources	Message Broker (COTS), server version		
Proposed System Enhancements	• Uses OTN • Accesses the integration system via Message Broker • Retrieves data from the Central Magistrate database, and updates local databases • Receives data from CCH and updates local databases • Sends court disposition data to CCH • Authorized user triggers all requests to send and receive data to/from remote systems • Sends and receives event related data		
Labor Resources	Task	Man-Days	Man-Years
	Management	106	0.41
	System Design	212	0.82
	Development	333	1.28
	Testing	130	0.50
	Agency Impacts		0.79
	Total		**3.79**

Exhibit D.1-1. Resources to implement an integration solution on CAIS

D.2 Impact Assessment on Virginia Commonwealth Attorney Information System (VCAIS), a local case management system

Exhibit D.2-1 shows the resources needed to enhance the existing VCAIS, operated by the Commonwealth Attorney Services Council, in order for it to participate in the integration solution.

Proposed Architecture	Gateway		
Additional Hardware Resources	None required		
Additional Software Resources	Custom code		
Proposed System Enhancements	• Uses OTN to access data • Accesses the integration system via a gateway • Receives data from SCV/Central Magistrate database – online receipt of data would be used (cut/paste) to reduce redundant data entry • Sends data to Wanted Persons – data sent to Wanted Persons would be used to update current records or to remove arrest warrant • Sends data to Central Booking System • Sends data to Local Jail Management System • Authorized user triggers all requests to send and receive data to/from remote systems • Sends and receives event related data		
Labor Resources	Task	Man-Days	Man-Years
	Management	100	0.38
	System Design	203	0.78
	Development	316	1.22
	Testing	120	0.46
	Agency Impacts		0.74
	Total		**3.58**

Exhibit D.2-1. Resources to Implement an Integration Solution on Local Case Management Systems

D.3 Impact Assessment on Local Inmate Data System (LIDS)

Exhibit D.3-1 shows the resources needed to enhance the existing LIDS, operated by the State Compensation Board, in order for it to participate in the integration solution.

Proposed Architecture	Message Broker (e.g., COTS middleware)		
Additional Hardware Resources	None required		
Additional Software Resources	Message Broker (COTS), server version		
Proposed System Enhancements	• Uses OTN to access data • Accesses the integration system via Message Broker • Receives data from SCV/Central Magistrate database – online receipt of data would be used (cut/paste) to reduce redundant data entry • Receives data from Local Jails • Transmits data to Local Jails • Accesses all remote systems via Message Broker • Authorized user triggers all requests to send and receive data to/from remote systems • Sends and receives event related data		
Labor Resources	Task	Man-Days	Man-Years
	Management	112	0.43
	System Design	230	0.88
	Development	356	1.37
	Testing	141	0.54
	Agency Impacts		0.84
	Total		**4.07**

Exhibit D.3-1. Resources to Implement an Integration Solution on LIDS

D.4 Impact Assessment on Local Jail Systems

Exhibit D.4-1 shows the resources needed to enhancements to jail systems operated by local jurisdictions, in order for them to participate in the integration solution. Note that this labor estimate applies both to the effort to develop changes to the LIDS client system used in some jurisdictions, as well as the efforts to develop a standard interface specification for the COTS vendors of products used in the remaining jurisdictions.

Proposed Architecture	Gateway		
Additional Hardware Resources	None required		
Additional Software Resources	Custom code		
Proposed System Enhancements	• Uses OTN to access data • Accesses the integration system via a gateway • Receives data from SCV/Central Magistrate database – online receipt of data would be used (cut/paste) to reduce redundant data entry • Sends data to LIDS • Receives data from LIDS • Sends data to Central Booking System • Authorized user triggers all requests to send and receive data to/from remote systems • Sends and receives event related data		
Labor Resources	Task	Man-Days	Man-Years
	Management	100	0.38
	System Design	203	0.78
	Development	316	1.23
	Testing	120	0.46
	Agency Impacts		0.74
	Total		**3.58**

Exhibit D.4-1. Resources to Implement an Integration Solution on Local Jail Systems

D.5 Impact Assessment on Booking Systems (Livescan)

Exhibit D.5-1 shows the resources needed to enhance the existing booking systems, operated by the local jurisdictions according to Virginia State Police standards, in order for them to participate in the integration solution.

Proposed Architecture	Gateway		
Additional Hardware Resources	None required		
Additional Software Resources	Custom code		
Proposed System Enhancements	• Uses OTN to access data • Accesses the integration system via a gateway • Receives charge data from one of three sources (option left up to the local agency): – Central repository of all charges, regardless of source (warrant, direct indictment, summons, etc.) – Local Jail Management Systems – Local Criminal Case Management Systems • Includes OTN in data (EFTS) transmitted to VSP • Includes incident number in data (EFTS) transmitted to VSP • Authorized user triggers all requests to send and receive data to/from remote systems • Sends and receives event related data		
Labor Resources	Task	Man-Days	Man-Years
	Management	138	0.53
	System Design	246	0.95
	Development	436	1.68
	Testing	167	0.64
	Agency Impacts		1.05
	Total		**4.85**

Exhibit D.5-1. Resources to Implement an Integration Solution on Booking Systems

D.6 Impact Assessment on Booking Systems (Card Scan and NATMS)

Exhibit D.6-1 shows the resources needed to enhance the existing booking systems, operated by the local jurisdictions according to Virginia State Police standards, in order for them to participate in the integration solution.

Proposed Architecture	Gateway		
Additional Hardware Resources	None required		
Additional Software Resources	Custom code		
Proposed System Enhancements	• Uses OTN in card-scan data • Includes OTN in data (EFTS) transmitted from live-scan and card-scan • Includes OTN in data transmitted to CCH • Sends and receives event related data		
Labor Resources	Task	Man-Days	Man-Years
	Management	138	0.53
	System Design	246	0.95
	Development	436	1.68
	Testing	167	0.64
	Agency Impacts		1.05
	Total		**4.85**

Exhibit D.6-1. Resources to Implement an Integration Solution on Card Scan and NATMS

D.7 Impact Assessment on Centralized Criminal History (CCH)

Exhibit D.7-1 shows the resources needed to enhance the existing CCH system, operated by the Virginia State Police, in order for it to participate in the integration solution.

Proposed Architecture	Message Broker (e.g., COTS middleware)		
Additional Hardware Resources	None required		
Additional Software Resources	Message Broker (COTS), client-side version		
Proposed System Enhancements	• Uses OTN to access data • Implements charging data standards, including uniform offense code • Includes OTN in booking data • Includes incident number in booking data • Accesses the integration system via Message Broker • Receives charge data from central charge database • Receive list of Court cases from Supreme Court and return booking status • Receives court disposition data from CAIS • Receives arrest data from Central Booking System • Sends list of outstanding arrest warrants to Wanted Persons • Receives obligation data from Dept. of Corrections • Sends notification of arrests to Wanted Persons • Authorized user triggers all requests to send and receive data to/from remote systems • Sends and receives event related data		
Labor Resources	Task	Man-Days	Man-Years
	Management	116	0.45
	System Design	208	0.80
	Development	368	1.42
	Testing	142	0.57
	Agency Impacts		0.81
	Total		**4.05**

Exhibit D.7-1. Resources to Implement an Integration Solution on CCH

D.8 Impact Assessment on Wanted Persons

Exhibit D.8-1 shows the resources needed to enhance the existing Wanted Persons system, operated by the Virginia State Police, in order for it to participate in the integration solution.

Proposed Architecture	Message Broker (e.g., COTS middleware)		
Additional Hardware Resources	None required		
Additional Software Resources	Message Broker (COTS), client-side version		
Proposed System Enhancements	• Uses OTN to access data • Accesses the integration system via Message Broker • Receives arrest warrant updates from Local Criminal Case Management systems (local police agencies) • Receives list of active warrants from CCH • Receives list of arrests (which originates from bookings) from CCH • Authorized user triggers all requests to send and receive data to/from remote systems • Sends and receives event related data		
Labor Resources	Task	Man-Days	Man-Years
	Management	105	0.40
	System Design	188	0.72
	Development	329	1.27
	Testing	127	0.49
	Agency Impacts		0.69
	Total		**3.57**

Exhibit D.8-1. Resources to Implement an Integration Solution on Wanted Persons

D.9 Impact Assessment on Offender Based State Correctional Information System (OBSCIS)

Exhibit D.9-1 shows the resources needed to enhance the existing OBSCIS, operated by the Department of Corrections, in order for it to participate in the integration solution. Note: The Integrated Correctional Information System (ICIS) is intended to replace the majority of OBSCIS' functionality in the future. Therefore, we expect some as yet unquantified impact on that system also.

Proposed Architecture	Message Broker (e.g., COTS middleware)		
Additional Hardware Resources	None required		
Additional Software Resources	Message Broker (COTS), sever version		
Proposed System Enhancements	• Uses OTN to access data • Accesses the integration system via Message Broker • Sends offender status information to VSP (currently FTP) • Sends reimbursement information to SCB • Receives charge information from courts and/or Magistrates • Sends and receives event related data		
Labor Resources	Task	Man-Days	Man-Years
	Management	112	0.43
	System Design	198	0.76
	Development	350	1.35
	Testing	135	0.52
	Agency Impacts		0.77
	Total		**3.83**

Exhibit D.9-1. Resources to Implement an Integration Solution on OBSCIS

D.10 Impact Assessment on Pre-Sentence Investigations (PSI)

Exhibit D.10-1 shows the resources needed to enhance the existing PSI system, operated by the Department of Corrections, in order for it to participate in the integration solution. Note: The Integrated Correctional Information System (ICIS) is intended to replace the majority of PSI's functionality in the future. Therefore, we expect some as yet unquantified impact on that system also.

Proposed Architecture	Message Broker (e.g., COTS middleware)		
Additional Hardware Resources	None required		
Additional Software Resources	Message Broker (COTS), client-side version		
Proposed System Enhancements	• Uses OTN to access data • Accesses the integration system via Message Broker • Sends Pre-Sentencing investigation reports to the VA Sentencing Commission • Receives CCH data from VSP • Receives court dockets and court disposition data from CAIS • Sends and receives event related data		
Labor Resources	Task	Man-Days	Man-Years
	Management	100	0.38
	System Design	182	0.70
	Development	320	1.23
	Testing	123	0.47
	Agency Impacts		0.73
	Total		**3.52**

Exhibit D.10-1. Resources to Implement an Integration Solution on PSI

D.11 Impact Assessment on Time Information Processing System (TIPS)

Exhibit D.11-1 shows the resources needed to enhance the existing TIPS, operated by the Department of Corrections, in order for it to participate in the integration solution. Note: The Integrated Correctional Information System (ICIS) is intended to replace the majority of TIPS' functionality in the future. Therefore, we expect some as yet unquantified impact on that system also.

Proposed Architecture	Message Broker (e.g., COTS middleware)		
Additional Hardware Resources	None required		
Additional Software Resources	Message Broker (COTS), client-side version		
Proposed System Enhancements	• Uses OTN to access data • Accesses the integration system via Message Broker • Sends offender status information to VSP (currently FTP) • Sends reimbursement information to SCB • Receives charge information from courts and/or Magistrates • Sends and receives event related data		
Labor Resources	Task	Man-Days	Man-Years
	Management	95	0.37
	System Design	170	0.65
	Development	300	1.15
	Testing	115	0.41
	Agency Impacts		0.66
	Total		**3.28**

Exhibit D.11-1. Resources to Implement an Integration Solution on TIPS

D.12 Impact Assessment on Virginia Community Corrections Information System (VACCIS)

Exhibit D.12-1 shows the resources needed to enhance the existing VACCIS, operated by the Department of Corrections, in order for it to participate in the integration solution. Note: The Integrated Correctional Information System (ICIS) is intended to replace the majority of VACCIS' functionality in the future. Therefore, we expect some as yet unquantified impact on that system also.

Proposed Architecture	Message Broker (e.g., COTS middleware)		
Additional Hardware Resources	None required		
Additional Software Resources	Message Broker (COTS), client-side version		
Proposed System Enhancements	• Uses OTN to access data • Accesses the integration system via Message Broker • Sends offender status information to VSP (currently FTP) • Sends and receives event related data		
Labor Resources	Task	Man-Days	Man-Years
	Management	89	0.34
	System Design	159	0.61
	Development	280	1.08
	Testing	108	0.42
	Agency Impacts		0.60
	Total		**3.04**

Exhibit D.12-1. Resources to Implement an Integration Solution on VACCIS

D.13 Impact Assessment on Department of Motor Vehicles

Exhibit D.13-1 shows the additional resources needed at DMV as a result of integration of criminal justice systems.

Proposed Architecture	None required
Additional Hardware Resources	None required
Additional Software Resources	None required
Proposed System Enhancements	None required
Labor Resources	The major impacts will be an increase in volume of requests for photo data, which will increase personnel workloads and transmission costs.

Exhibit D.13-1. Resources to Implement an Integration Solution on DMV Systems

D.14 Impact Assessment on Forensic Science

Exhibit D.14-1 shows the resources needed to enhance the existing Forensic Science DNA database system, operated by DCJS, in order for it to participate in the integration solution.

Proposed Architecture	Message Broker (e.g., COTS middleware)		
Additional Hardware Resources	None required		
Additional Software Resources	Message Broker (COTS), client-side version		
Proposed System Enhancements	• Uses OTN to access data • Accesses the integration system via Message Broker • Receives information from the VSP Sex Offender Registry • Receives information from LIDS • Receives information from DOC • Updates CCH with DNA status • Sends and receives event related data		
Labor Resources	Task	Man-Days	Man-Years
	Management	126	0.48
	System Design	227	0.87
	Development	400	1.54
	Testing	156	0.60
	Agency impacts		0.87
	Total		**4.37**

Exhibit D.14-1. Resources to Implement an Integration Solution on the Forensic Science System

D.15 Impact Assessment on Pre-Trial Case Management System

Exhibit D.15-1 shows the resources needed to enhance the existing Pre-Trial and Community Corrections Case Management system, operated by DCJS, in order for it to participate in the integration solution.

Proposed Architecture	Message Broker (e.g., COTS middleware)		
Additional Hardware Resources	None required		
Additional Software Resources	Message Broker (COTS), client-side version		
Proposed System Enhancements	• Uses OTN to access data • Accesses the integration system via Message Broker • Receives charge information from the Magistrates • Receives court information from SCV • Receives jail information from LIDS • Sends and receives event related data		
Labor Resources	Task	Man-Days	Man-Years
	Management	120	0.46
	System Design	216	0.83
	Development	380	1.46
	Testing	146	0.56
	Agency Impacts		0.84
	Total		**4.15**

Exhibit D.15-1. Resources to Implement an Integration Solution on the Pre-Trial Case Management System

D.16 Integration Infrastructure

Exhibit D.16-1 shows the resources needed to implement an integration infrastructure to support electronic data sharing among the participating systems. This is a new system rather than a modification of an existing system. DCJS would have responsibility for implementing the system, but the hardware may be located at another agency's computer site for operational monitoring purposes.

Proposed Architecture	Message Broker (e.g., COTS middleware)		
Hardware Resources	Sun Server (e.g., Enterprise 450 or equivalent)		
Software Resources	Message Broker COTS, server-side version		
Proposed System Enhancements	• Serves as messaging hub for all integration system transactions • Message queues and routing implemented via a message broker • Accesses Central Magistrate database (using OTN), as needed, to retrieve charge information captured by the magistrates • Routing tables contain addresses for all participating systems: – Central Magistrate – Local Criminal Case Management – Local Jail Management – LIDS – Booking – CCH – CAIS – Wanted Persons – Pre-Sentencing Committee		
Labor Resources	Task	Man-Days	Man-Years
	Management	197	0.76
	System Design	366	1.41
	Development	616	2.37
	Testing	240	0.92
	Agency Impacts		1.40
	Total		**6.86**

Exhibit D.16-1. Resources to Implement an Integration Infrastructure

D.17 Impact Assessment on the Juvenile Tracking System

Exhibit D.17-1 shows the resources needed to enhance the existing Juvenile Tracking System, operated by Department of Juvenile Justice, in order for it to participate in the integration solution.

Proposed Architecture	Message Broker (e.g., COTS middleware)		
Additional Hardware Resources	None required		
Additional Software Resources	Message Broker (COTS), client-side version		
Proposed System Enhancements	• Uses OTN to access data • Accesses the integration system via Message Broker • Sends and receives event related data		
Labor Resources	Task	Man-Days	Man-Years
	Management	120	0.46
	System Design	128	0.49
	Development	380	1.46
	Testing	146	0.56
	Agency Impacts		0.77
	Total		**3.74**

Exhibit D.17-1. Resources to Implement an Integration Solution on the Juvenile Tracking System

D.18 Impact Assessment on Magistrate System

Exhibit D.18-1 shows the resources needed to enhance the Magistrate System, operated by Supreme Court of Virginia, in order for it to participate in the integration solution.

Proposed Architecture	Message Broker (e.g., COTS middleware)		
Additional Hardware Resources	None required		
Additional Software Resources	Message Broker (COTS), client-side version		
Proposed System Enhancements	• Uses OTN to access data • Accesses the integration system via Message Broker • Standard charge code tables implemented • Underlying data structures modified to implement standard data elements • Warrants and charge data transferred to central server • Sends and receives event related data		
Labor Resources	Task	Man-Days	Man-Years
	Management	106	0.41
	System Design	212	0.82
	Development	333	1.28
	Testing	130	0.50
	Agency Impacts		0.79
	Total		**3.79**

Exhibit D.18-1. Resources to Implement an Integration Solution on the Magistrate System

D.19 Impact Assessment on Local Law Enforcement Record Management Systems

Exhibit D.19-1 shows the resources needed to support enhancements to local law enforcement systems, in order for them to fully participate in the integration solution. This labor estimate applies to setting up the gateway infrastructure and developing a standard interface specification for the COTS vendors of law enforcement systems.

Proposed Architecture	Gateway		
Additional Hardware Resources	None required		
Additional Software Resources	Custom code		
Proposed System Enhancements	• Uses OTN to access data • Accesses the integration system via a gateway • Receives data from SCV/Central Magistrate database – online receipt of data would be used (cut/paste) to reduce redundant data entry • Sends data to Central Booking System • Authorized user triggers all requests to send and receive data to/from remote systems • Sends and receives event related data		
Labor Resources	Task	Man-Days	Man-Years
	Management	100	0.38
	System Design	203	0.78
	Development	316	1.23
	Testing	120	0.46
	Agency Impacts		0.74
	Total		**3.58**

Exhibit D.19-1. Resources to Implement an Integration Solution on Local Law Enforcement Record Management Systems

Appendix E

References

Appendix E – References

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